

DECiPHER

The *housing* domain of municipal influence

1. *Purpose.*

This note reviews the potential impact of municipal housing programmes on reducing cardiovascular disease (CVD) in European cities.

2. *Rationale.*

The aim of DECiPHER is to produce a training package for municipalities which helps decision-makers optimise the mix of citywide programmes and investments to maximise public health impacts. The training package (VET) depends on a cost-benefit model, initially focusing on CVD as the biggest cause of death and disability in Europe. The first work package of DECiPHER led by Sheffield Hallam University, includes work to enhance the extant model of 'downstream' or proximal determinants of health by incorporating 'upstream' or 'distal' determinants of health. Housing is one of the six distal domains selected by partners as a potentially important municipal influence on the prevalence of CVD.

3. *Method.*

This is a preliminary assessment of the scope, scale and potential impact of municipal investment in the housing domain. First we develop a schematic model, then second, plug-in evidence from 27 scientific studies to populate the model.

4. *Role and influence of European municipalities.*

Municipalities have influence (and often a constitutional/legal **competence**) over the housing domain either by (i) providing a strategic framework for city development (ii) directly providing services and investment from the municipal budget (iii) purchasing services from contracting agencies, or (iv) influencing the investment programmes and services of **partner** agencies. Specifically, city governments may influence the quantity and quality of the local housing stock in three ways, by (i) regulation (ii) provision and (iii) financial support.

- (i) *Regulation.* Led by the Napoleonic reforms in France following the 1787 Revolution, European municipalities have a historic role in regulating sanitary conditions. Environmental health was a key component of the municipal public health function which developed in response to the industrialisation of many European Cities in the 19th Century. In the late 20th Century, as now, environmental health is a municipal function in most European states, whereas health services (and to a lesser extent) public health, are most often the responsibility of national and regional governments. ⁱⁱ
- (ii) *Provision.* Responding to a shortage of good quality housing, many European municipalities built and administered their own stock from the early 20th Century onwards. By the turn of the second Millennium, owner-occupation

had largely replaced private renting as the dominant tenure form in most European states and 'social' housing provision had become more complex. ⁱⁱⁱ In Sweden, circa 25% of the housing stock is rented from municipal housing companies with boards appointed by the municipality. In Britain circa 20% of the housing stock is 'social,' mainly owned by municipalities, though often managed by housing associations. France has a similar proportion of social housing, owned and managed by a 'weaker form' of municipal housing company. Finland has a small proportion of socially rented housing (circa 16%) with two-thirds managed by municipal housing companies.

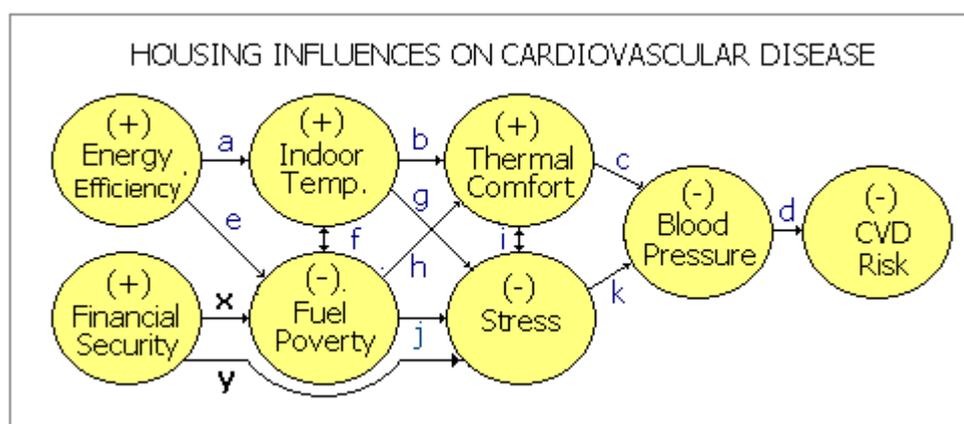
- (iii) *Finance.* Often as agents of central government, municipalities provide financial subsidies to reduce the cost of housing. Systems vary across European states but most provide subsidies to the capital costs of construction (by sub-market interest rates and land purchase) or to cover the rents payable by the poorest tenants. In Finland, France, Germany and Sweden (and to a lesser extent in Britain) owner-occupiers can also claim a housing allowance. Additionally, many municipalities provide housing support services such as advice and advocacy.

5. *Two pathways to reducing CVD: increasing warmth and reducing stress.*

Historically the environmental health function of municipalities was to curtail the spread of infectious diseases. By the mid-20th Century, success in eliminating these major causes of death gave rise to a 'health revolution' or 'epidemiological transformation.'^{iv} Noncommunicable diseases such as cancer and CVD have replaced communicable diseases as the biggest causes of death in Europe. Though it is necessary to maintain high levels of investment in housing infrastructure and sanitation to prevent the return of infectious diseases, the focus is now on additional investments which would modestly reduce the risk of CVD.

Scientific evidence indicates there are two main pathways from housing to CVD, with (i) cold living conditions and (ii) financial insecurity as the main drivers.^v Schematic figure 1 indicates *first* how investment in home energy efficiency measures (i) could increase temperatures, increase thermal comfort and reduce the risk of CVD. *Second*, more complex are the pathways via which financial security reduces stress (ii). These segmented pathways are elaborated below.

- (i) *Living conditions.* There is substantial evidence that living in cold conditions raises blood pressure and thereby increases the risk of CVD (d in figure 1). Early Lancet editorials by Mckee^{vi} and Khaw^{vii} highlight the connection and Goodwin^{viii} reviews the compelling scientific evidence, both biological and epidemiological. Thermal comfort mediates the relationship between temperature and the risk of CVD (b-c in figure 1): residents may preserve body temperatures by wearing more clothing or adapting in other ways to relieve cold strain.^{ix} Evidence from the health impact evaluation of the UK government's Warm Front shows that energy efficiency measures raised indoor temperatures. Therefore we can confidentially assume the segmented pathway (a-b-c-d) of this form of housing investment on the risk of CVD.



- (ii) *Financial security.* Stress is a key mediating variable in the route from financial insecurity to raised CVD risk. Public perception of chronic stress as an important cause of heart disease^x (k-d in figure 1) is supported by scientific evidence^{xi-xii} though the relationship is complex and contested.^{xiii} In *Social Determinants of Health: Solid Facts*,^{xiv} the popular publication commissioned by the WHO European Healthy Cities Network, Richard Wilkinson and Michael Marmot distinguish short term from long term psychosocial stress: ‘if the tension goes on for too long, [people] become more vulnerable to a wide range of social conditions including infections, diabetes, high blood pressure, heart attack, stroke, depression and aggression.’ Depression is intimately linked to stress and has an independent effect on CVD.^{xv}

Upstream, there are multiple pathways from financial security to the alleviation of stress and depression. The Warm Front evaluation team found that the alleviation of fuel poverty (via increased energy efficiency) had a more significant impact on health (e-j-k) than raised indoor temperatures (a-b-c). Removing the difficulty of paying fuel bills reduced stress and improved mental health.^{xvi}

Other housing programmes to promote generic household security (x and y) are more difficult to evaluate because not easily separated from a wider socio-economic context. Glasgow researchers show how the home provides existential security, specifically giving occupiers control over their environment and providing a haven for both renters and owner-occupiers in an increasingly uncertain world.^{xvii} Financial pressures on owners erode this existential security causing anxiety and depression.^{xviii} Analysis of unsustainable housing commitments by Mark Taylor and colleagues underlines chronic financial insecurity (distinguished from shorter term events) as the more important cause of anxiety and depression.^{xix} Assuming that these processes are reversible by interventions from central and municipal governments, then evidence supports the two pathways (x-j-k-d and y-k-d) to reducing the risk of CVD.

6. Cost-benefit: scale & scope

Municipal priorities will depend on (a) the scale of the problem (b) the efficacy of measures to remove or mitigate the problem and (c) the cost of these measures. At this stage in the development of the DECiPHER model and tool we will give a preliminary assessment of scope and scale.

- (i) *Cold Conditions.* A marker of the impact of cold living conditions is the Excess Winter Mortality (EWD) or Coefficient of Seasonal Variation in Mortality (CSVM) evident in all European countries and cities. Expressed as a ratio of average monthly deaths in the winter compared with monthly deaths in the summer, Europe exhibits a 'paradox of EWD' with higher mortality rates generally found in less severe, milder climates such as the UK and Ireland (table 1).^{xx} The main determinants of CSVM appear to be energy efficiency levels, with cavity wall insulation, double glazing and floor insulation all significant at the 5% level.

Table 1: Season variation in mortality, external winter temperature, domestic energy efficiency and fuel poverty

	(1) CSVM	(2) Mean winter temperature °C	(3) Cavity wall insulation (% houses)	(4) Double glazing (% houses)	(5) Fuel poverty (% households)
<i>Austria</i>	0.14	+1.4	26	11	6
<i>Belgium</i>	0.13	+3.7	42	12	10
<i>Denmark</i>	0.12	+2.1	65	63	4
<i>Finland</i>	0.10	-3.5	100	100	5
<i>France</i>	0.13	+7.0	68	24	10
<i>Germany</i>	0.11	+1.6	24	15	5
<i>Greece</i>	0.18	+11.6	12	6	33
<i>Ireland</i>	0.21	+5.8	42	22	9
<i>Netherlands</i>	0.11	+4.3	47	27	6
<i>Norway</i>	0.12	low	85	88	-
<i>Portugal</i>	0.28	+13.5	6	2	50
<i>Sweden</i>	0.12	low	100	100	-
<i>Spain</i>	0.21	+6.5	-	-	32
<i>UK</i>	0.18	+5.4	25	4	9

Source: Healy (2003) Original data from Eurostat, 1994-1997.

The headline figure of EWD is politically charged in the UK and has generated many of the intervention studies. Though on a shallow downward trajectory, a CSVM of 0.18 translates into circa 40,000 excess deaths a year, with circa 20,000 of these attributable to living in cold conditions.^{xxixxii} Cold conditions in another 40,000 households are so harmful to health they result in occupiers seeking medical attention.^{xxixxiii} Circa 10,000 EWD are attributable to CVD and cold conditions also increase the risk of non-fatal strokes and heart attacks.

Even in the UK, with one of the largest populations in the European Union (c60 million) the scale of the problem of CVD arising from cold conditions is modest. In the city of Sheffield with a population of 530,000, EWD are circa 400 with circa 100 attributable to living in cold conditions and 50 of these attributable to CVD. In another 100 dwellings cold conditions will cause occupiers to seek medical attention for CVD. The scope for proportionate improvement in Ireland, Portugal, Greece and Spain – all with higher CSVMs – is greater, though these countries have smaller populations. There is probably no scope for improvement in Finnish and Swedish cities where energy efficiency measures are exemplary.

The objective for the poor performing countries and cities should be to reproduce the energy efficiency prevailing in the best and eliminate cold-induced CVD deaths. There is some preliminary UK evidence on the cost-effectiveness of energy efficiency measures. The Warm Front Study Group estimates that for a dwelling containing a married couple of 65 years of age, the average cost per life year saved ranged from £13,000 @ 2004 prices (€15,000 @ 2009 exchange rate 1:1.13) for insulation measures to around £30,000 for heating plus insulation over a 10 year horizon, and £4000 for insulation and £21,000 for heating plus insulation over 20 years.^{xxiv xxv}

- (ii) *Financial Security.* The deep global recession (2008 – 2009) stimulated by the 2007 ‘credit crunch’ exposed the fragility of housing markets and the vulnerability of ‘sub-prime’ owner-occupiers to a decline in property values. In all European countries rising unemployment has increased the proportion of households with difficulty meeting mortgage repayments. The extent of unsustainable housing commitments varies across European countries, with highly deregulated markets, such as the UK, faring worst.^{xxvi} The next stage of refining the DECiPHEr model will introduce estimates of the proportion of households experiencing difficulty sustaining mortgage repayments. As an indication, at the nadir in 1992 of the previous UK economic recession, 396,300 households were between 6-12 months in arrears with their mortgage payments, an additional 260,900 were more than 12 months in arrears and 68,600 properties were repossessed by mortgage suppliers.^{xxvii}

Taylor et al (cited earlier) show how male heads of households with housing repayment problems score 1.3 higher (range 0-36) on the GHQ measure of anxiety and depression. Those in arrears score 1.95 higher. The equivalent scores for female heads of households are more modest, those in difficulty scoring 0.62 points higher, but no higher than this for those in arrears. Nettleton & Burrows (also cited earlier) utilize a similar analysis of the British Household Panel Survey to report the ‘onset of mortgage problems leads to a 1.64 point increase in GHQ12 score (significant at $P < 0.001$) and for women is even higher at 2.51. In the next stage of refining the DECiPHEr model we intend to combine these ratios with those revealed by studies linking depression with a greater risk of heart disease. For example, Kamphius et al reveal how depressive symptoms in a population cohort drawn from Italy, the Netherlands and Finland increased the risk of cardiovascular mortality by 37%.

Macro-economic policies by European states are the primary means of addressing the structural problems which put households at financial risk. Already there is evidence that historically low interest rates have eased the difficulty of mortgage repayments even for sub-prime borrowers. However, municipalities and their partners from the third (voluntary) sector have an actual or potential role in providing social support. In their review of 81 studies Uchino et al^{xviii} distinguish emotional support of the kind that is provided by families and friends, from appraisal support (assessment, advice) of the kind that may be provided by the housing support services of a municipality. Both types act as a buffer against stress and reduce the risk of CVD. In the next stage of developing the DECiPHER will assess expenditure on municipal support services.

7. **Summary.** This note lays the foundations for developing the DECiPHER model to include a cost-benefit component of municipal investment in the housing domain. An initial schematic model suggests two routes to reducing the risk of CVD: alleviating cold conditions and reducing financial insecurity. Evidence from a number of scientific studies indicates the scale of impact for each segment of the principal routes. An indication of the cost of intervention is given. The next step is to combine these elements into a model which first gauges the cost-benefits of municipal intervention in the housing domain and then integrates the domain into the generic DECiPHER model.

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